3.13 AIR QUALITY

This section describes existing air quality conditions on and adjacent to the site. Potential impacts to air quality from infrastructure development and full buildout under the Proposed Actions (Alternatives 1 and 2) and the No Action Alternative are also evaluated. This section is based on the March 2005, Air Quality Technical Report, prepared by Parsons Brinckerhoff (see Appendix J).

3.13.1 Affected Environment

Air Quality Standards and Studies

The U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and Puget Sound Clean Air Agency (PSCAA) regulate air quality in the region. Under the Clean Air Act, EPA has established National Ambient Air Quality Standards (NAAQS), which specify maximum concentrations for carbon monoxide (CO), particulate matter less than 10 micrometers in size (PM_{10}), particulate matter less than 2.5 micrometers in size ($PM_{2.5}$), ozone, sulfur dioxide (SO_2), lead, and nitrogen dioxide (EPA, 1990). These regulated pollutants are referred to as criteria pollutants. The standards applicable to transportation and development projects are summarized in Table 3.13-1.

EPA has adopted a new eight-hour ozone standard (see Table 3.13-1); however, the old one-hour standard is still applicable for current nonconformity and maintenance areas. Regional ozone planning efforts by PSCAA consider both standards.

The eight-hour CO standard of 9 parts per million (ppm) is the standard most likely to be exceeded as the result of transportation and development projects.

Nonattainment Areas

Nonattainment areas are geographical regions where air pollutant concentrations exceed the NAAQS. Air quality maintenance areas are regions that have recently attained compliance with the NAAQS. The Tukwila South site lies within the Puget Sound ozone and CO air quality maintenance areas (see Figure 2 in Appendix J). Air quality emissions in the Puget Sound region are currently being managed under the provisions of Air Quality Maintenance Plans (AQMP) for CO. PSCAA and Ecology developed the current plans, and the EPA approved the plans in 1996. Any regionally significant transportation project in the Puget Sound Air Quality Maintenance areas must conform to the AQMPs. Conformity is demonstrated by showing that the project would not cause or contribute to any new violation of any NAAQS, increase the frequency or severity of any existing NAAQS violations, or delay timely attainment of the NAAQS.

Table 3.13-1
SUMMARY OF AMBIENT AIR QUALITY STANDARDS

Pollutant	National Primary Standard	Washington State Standard	PSCAA Regional Standard
CARBON MONOXIDE (CO)			
One-Hour Average (not to be exceeded more than once per year)	35 ppm	35 ppm	35 ppm
Eight-Hour Average (not to be exceeded more than once per year)	9 ppm	9 ppm	9 ppm
PM_{10}			
Annual Arithmetic Mean	50 µg/m^3	50 µg/m^3	50 µg/m^3
24-Hour Average Concentration (not to be exceeded more than once per year)	150 µg/m^3	150 µg/m^3	150 µg/m^3
$PM_{2.5}$			
Annual Arithmetic Mean	15 µg/m^3	NS	NS
24-Hour Average Concentration (not to be exceeded more than once per year)	65 µg/m^3	NS	NS
TOTAL SUSPENDED PARTICULATES (TSP)			
Annual Arithmetic Mean	NS	60 µg/m^3	60 µg/m^3
24-Hour Average Concentration (not to be exceeded more than once per year)	NS	150 µg/m^3	150 µg/m^3
OZONE			
One-Hour Average (not to be exceeded more than once per year)	0.12 ppm	0.12 ppm	0.12 ppm
Eight-Hour Average (not to be exceeded more than once per year)	0.08 ppm	NS	NS

Notes: ppm = parts per million
µg/m^3 = micrograms per cubic meter
NS = No Standard
Sources: PSCAA Regulation 1 (1994)
40 CFR Part 50 (1997)
WAC chapters. 173-470, 173-474, 173-175 (1987)

Source: Parsons Brinckerhoff, 2005.

Climate

Weather directly influences air quality. Important meteorological factors include wind speed and direction, atmospheric stability, temperature, sunlight intensity, and mixing depth. Temperature inversions, which are associated with higher air pollution concentrations, occur when warmer air overlies cooler air. During temperature inversions in late fall and winter, particulates and carbon monoxide (CO) from wood stoves and vehicle sources can be trapped close to the ground, which can lead to violations of the NAAQS. In the Puget Sound area, the highest ozone concentrations occur from mid-May until mid-September, when urban emissions are trapped by temperature inversions and followed by intense sunlight and high temperatures.

In 1999, Ecology adopted the Air Quality Index (AQI) that has been standardized by EPA. Using forecast meteorology and pollutant monitoring, Ecology and PSCAA forecast the AQI to be one of six levels: good, moderate, unhealthy to sensitive populations, unhealthy, very unhealthy, and hazardous.

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless, poisonous gas that reduces the blood's oxygen-carrying capability by bonding with hemoglobin and forming carboxyhemoglobin, which prevents oxygenation of the blood. Exposure to CO concentrations can result in moderate to severe health effects, depending on the concentrations of CO and the length of exposure (see Appendix J for details).

The major source of CO is vehicular traffic, industry, wood stoves, and slash burns. In urban areas, motor vehicles are often the source of over 90 percent of the CO emissions that cause ambient levels to exceed the NAAQS.

Areas of high CO concentrations are usually localized. They occur near congested roadways and intersections in fall and winter and are associated with light winds, cool temperatures, and stable atmospheric conditions. These localized areas of elevated CO levels are referred to as 'hot spots'. CO concentration decreases in most areas have resulted from stringent federal emission standards for new vehicles and the gradual replacement of older, more polluting vehicles. CO levels have declined in urban areas, but are leveling off or increasing in areas experiencing rapid growth in traffic volumes, including remote suburbs in the Puget Sound region.

Particulate Matter

Particulate matter includes small particles of dust, soot, and organic matter suspended in the atmosphere. Particulates less than 100 micrometers in diameter are measured as Total Suspended Particulates (TSP). Particles less than 10 micrometers in size are measured as PM_{10}, a component of TSP. Particles less than 2.5 micrometers in size are measured as $PM_{2.5}$, a component of PM_{10} and TSP. The smaller $PM_{2.5}$ and PM_{10} particles can be inhaled deeply into the lungs, potentially leading to respiratory diseases and cancer. Particulate matter may carry absorbed toxic substances, and the particle itself may be inherently toxic.

Sources of particulates include motor vehicles, industrial boilers, wood stoves, open burning, and dust from roads, quarries, and construction activities. Most vehicular emissions are in the $PM_{2.5}$ size-range, and road and construction dust is often in the larger PM_{10} size-range. Most vehicular fine-particulate emissions result from diesel vehicles, which release fine particulates both directly (mostly as carbon compounds) and indirectly (in the form of sulfur dioxide, a gas that reacts in the atmosphere to form sulfate particulates). High $PM_{2.5}$ and PM_{10} concentrations occur in fall and winter during periods of air stagnation and high use of wood for heat. In the Puget Sound Region, fireplaces and woodstoves account for almost two-thirds of winter $PM_{2.5}$ emissions. On-road vehicle emissions contribute approximately 12 percent of the region's $PM_{2.5}$ emissions, and construction and other dust sources contribute approximately 6 percent.

Ozone

Ozone, a highly toxic form of oxygen, is a major component of the complex chemical mixture that forms photochemical smog. Ozone is not produced directly, but formed by a reaction between sunlight, nitrogen oxides (NO_x), and hydrocarbons (HC). It is primarily a product of regional vehicular traffic, and point-source and fugitive emissions of the ozone precursors. Tropospheric (ground-level) ozone, which results from ground-level emissions, is a health risk, but stratospheric (upper-atmosphere) ozone (produced through a different set of chemical reactions that only require oxygen and intense sunlight) protects people from harmful solar radiation. For this analysis, the term ozone refers to tropospheric ozone.

As with $PM_{2.5}$, the EPA has adopted a new eight-hour ozone standard (see Table 3.13-1); however, the old one-hour standard is still applicable for current nonconformity and maintenance areas. Regional ozone planning efforts by PSCAA consider both standards.

In the Puget Sound area, the highest ozone concentrations occur from mid-May until mid-September, when urban emissions are trapped by temperature inversions followed by intense sunlight and high temperatures. Maximum ozone levels generally occur between noon and early evening at locations several miles downwind from the sources, after NO_x and HC have had time to mix and react under sunlight. Light, northeasterly winds arising during these conditions result in high ozone concentrations near the Cascade foothills, to the south and southeast of major Washington cities.

Emission Trends

Nationally, emissions of criteria pollutants decreased 25 percent between 1970 and 2001. In general, the air is noticeably cleaner than in 1970, and all criteria pollutant emissions from motor vehicles are less than they were in 1970, despite the fact that vehicle miles of travel have more than doubled. However, air quality standards for at least one NAAQS pollutant were not met in many areas in a study conducted in 1996 by EPA. Regional air pollutant trends have generally followed national patterns over the last 20 years. Carbon monoxide (CO) is the criteria pollutant most closely tied to transportation. Regionally, the maximum measured CO concentrations have decreased over the past 20 years.

Localized CO Concentrations

One-hour and eight-hour average CO concentrations under existing conditions were modeled using the same methodology as 2015 and 2030 predictions (see the description of methodology under Impacts later in this section). The modeled maximum one-hour CO concentration from vehicle emissions under existing conditions was 8.8 ppm, and the maximum eight-hour CO concentration from vehicle emissions under existing conditions was 6.2 ppm. The one-hour standard is 35 ppm and the eight hour standard is 9 ppm. No exceedances of the one hour or eight-hour average NAAQS for CO were identified (see Tables 3.13-2 and 3.13-3 later in this section).

3.13.2 Impacts

Following is an analysis of probable significant impacts associated with air quality. Impacts are discussed separately for the infrastructure development and full buildout phases. Alternatives 1 and 2 would include major infrastructure construction to facilitate site development as described in detail in Chapter 2. Under Alternatives 1 and 2, the proposed amount of site grading and the potential for impacts related to particulate emissions would be similar. At full buildout, Alternative 1 and 2 would have the same Southcenter Parkway lane configuration, but Alternative 2 would have 10 percent to 25 percent lower traffic volumes. Alternative 1 and the No Action

Alternative (to serve as a baseline) were quantitatively analyzed; Alternative 2 is addressed qualitatively.

Alternatives 1 and 2

Infrastructure Development Phase

Construction impacts would be experienced during both the infrastructure development and the full buildout phases. Fugitive emissions from particulate matter less than 10 micrometers in size (PM_{10}) would be associated with demolition, land clearing, ground excavation, and cut-and-fill operations. Construction emissions would be greatest during infrastructure development, because most emissions would be associated with moving dirt on the site.

PM_{10} emissions would vary from day to day, depending on the level of activity, specific operations, and weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the specific amount and type of operating equipment. Larger dust particles would settle near the source, and fine particles would be dispersed over greater distances from the construction site. The quantity of particulate emissions would be proportional to the area of the construction operations and the level of activity. Based on field measurements of suspended dust emissions from construction projects, an approximate emission factor for construction operations would be 1.2 tons per acre of construction per month of activity. Emissions would be reduced based on proposed mitigation (see Mitigation later in this section).

A few offsite residences located in proximity to Orillia Road are within several hundred feet of possible construction in Planning Areas G and I on site (see Figures 2-3 for a depiction of the planning areas). (Other nearby residences adjacent to the northwest portion of the site (near S 178th Street) would be removed as part of development.) Fugitive PM_{10} emissions from construction activities in proximity to Orillia Road could be noticeable, if uncontrolled. Construction would comply with the Puget Sound Clean Air Agency (PSCAA) regulations that require dust control during construction to prevent the deposition of mud on paved streets. Proposed measures to reduce the deposition of mud and emissions of particulates are identified in the Mitigation Measures section.

In addition to particulate emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate small particulates, CO, and NO_x in exhaust emissions. If construction traffic and lane closures were to increase congestion and reduce the speed of other vehicles in the area, emissions from traffic would increase temporarily while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site. Some construction activities (particularly during paving operations using asphalt) would result in short-term odors. These odors could be detectable to some people near the site, and would be diluted as distance from the site increases. There would be no burning of slash during construction.

Full Buildout

Air Quality Analysis Methodology

Average carbon monoxide (CO) peak-hour concentrations in parts per million (ppm) were calculated using Mobile 6.2 emission factors and CAL3QHC software. Existing traffic volumes for 2004 and predicted future traffic volumes for 2015 and 2030, as well as other traffic operations data, were taken from the transportation analysis prepared for this EIS (see Section 3.12, Transportation and Appendix I). CO concentrations were modeled at the following three intersections:

- S 180th Street and Southcenter Parkway
- Segale Drive C and Southcenter Parkway
- S 200th Street and Southcenter Parkway

These intersections are the primary intersections that would experience a configuration change in the Tukwila South site area under the EIS alternatives. These intersections would also experience the largest volume of project-generated traffic. Therefore, these intersections were selected for analysis.

Because MOBILE 6.2 accounts for gradual replacement of older vehicles with newer, less-polluting vehicles, the predicted emission rates for future years are lower than current emission rates (refer to Appendix J for further information on modeling).

CAL3QHC Model

CAL3QHC Version 2 is a model that predicts pollutant concentrations near roadways. CAL3QHC takes into account flow and calculated idle emission factors, roadway geometries, traffic volumes, site characteristics, background pollutant concentrations, signal timing, and meteorological conditions. CAL3QHC predicts pollutant concentrations in parts per million (ppm), averaged over a one-hour period near roadways. CAL3QHC was used to predict carbon monoxide (CO) concentrations at the analyzed intersections. CAL3QHC predicts peak one-hour pollutant concentrations based on stable weather conditions and peak-hour traffic flow.

Predicted worst-case one-hour and eight-hour average CO concentrations were evaluated for Alternative 1. Specific locations where CO concentrations were predicted are known as receptors. Receptors were modeled in locations where maximum concentrations would likely occur, because of traffic congestion, and where the general public would have access. Only the highest CO concentration at each intersection was reported for each modeled scenario (see Figure 4 in Appendix J for the receptor locations).

Air Quality Analysis Results

No exceedances of the one hour or eight-hour average National Ambient Air Quality Standards (NAAQS) for CO were predicted for Alternative 1. The modeled worst-case one-hour CO concentrations from vehicle emissions for the year 2015 and 2030, respectively, were 7.3 and 8.9 ppm, and worst-case eight-hour CO concentrations were 5.1 and 6.2 ppm. No exceedances of the one-hour average NAAQS of 35 ppm for CO were predicted under Alternative 1 for either year 2015 or 2030 (see Table 3.13-2).

Table 3.13-2
MAXIMUM ONE-HOUR AVERAGE CO CONCENTRATIONS

	Scenario				
Intersection	**Existing Conditions**	**Alternative 1: High Intensity Campus Development**		**Alternative 3: No Action**	
		2015	**2030**	**2015**	**2030**
S 180th Street and Southcenter Parkway	8.8	5.6	6.3	6.4	5.7
Segale Drive C and Southcenter	NA	7.0	7.7	NA	4.1
S 200th Street and Southcenter Parkway	NA	7.3	8.9	6.1	5.2

Notes:
Concentration values are in parts per million (ppm).
NA = Not Applicable (the intersection would not be signalized under this condition)
The one-hour NAAQS for CO is 35 ppm.

Source: Parsons Brinckerhoff, 2005.

Table 3.13-3
MAXIMUM EIGHT-HOUR AVERAGE CO CONCENTRATIONS

	Scenario				
Intersection	**Existing Conditions**	**Alternative 1: High Intensity Campus Development**		**Alternative 3: No Action**	
		2015	**2030**	**2015**	**2030**
S 180th Street and Southcenter Parkway	6.2	3.9	4.4	4.5	4.0
Segale Drive C and Southcenter	NA	4.9	5.4	NA	2.9
S 200th Street and Southcenter Parkway	NA	5.1	6.2	4.3	3.6

Notes:
Concentration values are in parts per million (ppm).
NA = Not Applicable (the intersection would not be signalized under this condition)
The eight-hour NAAQS for CO is 9 ppm.

Source: Parsons Brinckerhoff, 2005.

Additionally, no exceedances of the eight-hour average NAAQS of 9 ppm for CO were predicted under Alternative 1 for year 2015 or 2030 (see Table 3.13-3).

Increased residential land use would increase energy use for heating. The use of fireplaces and woodstoves, if present in residential buildings, would emit particulates and CO. Such emissions would be subject to PSCAA regulations, and fireplaces and woodstoves could not be used when a winter burn ban had been declared.

Alternative 2 would have the same Southcenter Parkway lane configuration as Alternative 1, but with 10 percent to 25 percent lower traffic volumes. Therefore, CO concentrations would be less for Alternative 2 than those predicted for Alternative 1. No exceedances of the one-hour average or eight-hour average NAAQS would be expected under Alternative 2 for year 2015 or 2030.

Similar to Alternative 1, increased residential land use would increase energy use for heating. The use of fireplaces and woodstoves, if present in residential buildings, would emit particulates and CO. Such emissions would be subject to PSCAA regulations, and fireplaces and woodstoves could not be used when a winter burn ban had been declared.

Conformity Determination

Improvements to regionally significant transportation facilities must comply with the project-level conformity criteria described in the U.S. Environmental Protection Agency (EPA) Conformity Rule, and with WAC Chapter 173-420. The extension of Southcenter Parkway is the only component of the Tukwila South Project that would require a conformity determination. The regional metropolitan planning organization (MPO) must also include the project in a conforming plan (MTP) and Transportation Improvement Plan (TIP) (this would occur subsequent to approval of the Proposed Actions by the City of Tukwila). A brief summary of the project's conformity to the State Implementation Plan (SIP) is presented in Appendix J.

Once the City of Tukwila submits the Southcenter Parkway extension for inclusion in the MTP and TIP, the improvement project would meet the conformity criteria of 40 CFR Part 93 and WAC 173-420-065.

Indirect/Cumulative

The air quality analysis was performed using projected traffic volumes for future years (2015 and 2030). These projected traffic volumes incorporated anticipated traffic generation from baseline growth in the site area. Therefore, the air quality analysis considered the secondary and cumulative effects of the Tukwila South Project and other traffic growth that would occur with or without the project. No other cumulative impacts would result.

No Action Alternative

In general, construction impacts would be similar to impacts discussed above for Alternatives 1 and 2. However, given that less grading and site disturbance would occur under the No Action Alternative, and less site area would be developed (as the flood protection barrier dike would not be relocated), construction-related impacts would be less.

No exceedances of the one hour or eight-hour average NAAQS for CO were predicted for the No Action Alternative. The modeled worst-case one-hour CO concentration from vehicle emissions for the year 2015 and 2030, respectively, were 6.4 and 5.7 ppm, and worst-case eight-hour CO concentrations were 4.5 and 4.0 ppm. No exceedances of the one-hour average NAAQS of 35 ppm for CO were predicted under the No Action Alternative for either year 2015 or 2030 (see Table 3.12-2). Additionally, no exceedances of the eight-hour average NAAQS of 9 ppm for CO were predicted for the No Action alternative for either year 2015 or 2030 (see Table 3.13-3).

The emission of air pollutants from new industrial development, potentially including toxic emissions from industrial sources within the site, would be required to comply with PSCAA regulations. Major sources would require emission permits, which would regulate their emissions.

3.13.3 Mitigation Measures

Proposed mitigation measures to control PM_{10}, deposition of particulate matter and emissions of CO and NO_x during construction (primarily during infrastructure development) per the Associated General Contractors of Washington Guidelines (1997) could include:

- Spraying exposed soil with water or other dust palliatives to reduce emissions of PM_{10} and deposition of particulate matter;
- Covering all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck) to reduce PM_{10} and deposition of particulates during transportation;
- Providing wheel washers to remove particulate matter that vehicles would otherwise carry offsite to decrease deposition of particulate matter on area roadways;
- Removing particulate matter deposited on paved, public roads if any, to reduce mud and resultant windblown dust on area roadways;
- Routing and scheduling construction trucks to reduce delays to traffic during peak travel times to reduce secondary air quality impacts caused by a reduction in traffic speeds while waiting for construction trucks;
- Placing quarry spall aprons where trucks enter public roads to reduce mud track-out;
- Graveling or paving haul roads to reduce particulate emissions;
- Requiring appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel to reduce CO and NO_x emissions in vehicular exhaust;
- Using relatively new, well-maintained equipment to reduce CO and NO_x emissions;
- Planting vegetative cover or paving as soon as possible after grading to reduce windblown particulates in the area; and,
- Routing construction trucks away from residential areas to minimize annoyance from dust.

Because no NAAQS exceedances are predicted at full buildout, no design or operational mitigation measures would be required.

3.13.4 Significant Unavoidable Adverse Impacts

None are anticipated.